

VII. *On the Family of Triuriaceæ.* By JOHN MIERS, Esq., F.R.S., F.L.S. &c.

Read April 2 and 16, 1850.

IT is now about nine years since I offered to the notice of the Linnean Society the description of *Triuris hyalina*, which was honoured by a place in its Transactions*. Upon that occasion, after giving the details of its structure, I remarked, that as it could not be referred to any known natural order, it might be received as the type of a distinct family, which I suggested as holding a place near *Fluviales*, or *Burmanniaceæ*, but whose positive rank in the system could not be known until we obtained some information relative to the structure of the seed and its embryo †.

The subsequent discovery, by my much lamented friend Mr. Gardner, of a very analogous plant with female flowers only, differing in no respect from *Triuris*, except in having six divisions instead of three in the perianthium, and in a more lateral and less pointed style, supplied an interesting fact; but as its carpels were not in a more advanced state of development, it afforded no insight whatever into the structure of the seed. That indefatigable botanist, whose recent loss we must all greatly deplore, in the paper he presented to the Society on this subject ‡, offered several speculations upon the affinities of his plant and of *Triuris*, tending to show, as I will prove, erroneously, that they were allied to *Smilacææ*; and upon such unestablished data he drew out § a diagnosis of the family I had previously suggested. In that memoir he stated, that in juxtaposition with his plant he found another of similar size, presenting a single petiolar blade, much resembling the leaf of a *Cissampelos* ||. Although he failed in tracing any underground connexion between the roots of these two plants, he concluded too hastily that the one appertained to the other, and hence he inferred that his plant was related to *Menispermaceæ* or *Smilacææ*. He offered at the same time an opinion, that I had overlooked a similar distinct leafy appendage in *Triuris*; but this certainly was not the case, for on quitting the Organ Mountains in 1838, I carefully gathered all the specimens I could find, with the soil and moss attached, keeping them well moistened for two months, until I embarked for England, hoping to witness a further development of the ovaria: at the same time, I examined the moss for any remains of seed or seed-vessel of previous growth: and hence I feel assured that had any such leafy appendage existed in connexion with *Triuris*, it could not have escaped my frequent and searching observation. The stem of *Triuris*, in the living state, is quite hyaline and transparent, appearing composed of simple cellular tissue, without any visible longitudinal vessels, except toward the centre, where it is somewhat more compact. On comparing Mr. Gardner's plant with *Triuris* in the dried state, both exhibit a similar structure, appearing quite translucent externally, with central darker axile lines. The stem of

* Linn. Trans. vol. xix. p. 77.

† *Ibid.* p. 80.‡ *Ibid.* p. 155.§ *Ibid.* p. 160.|| *Ibid.* p. 156. tab. 15. fig. 4.

the leaf, however, offers a very different appearance; it is far more opaque, not darkened in the centre, but altogether traversed by numerous longitudinal vessels, which can be traced distinctly in continuity with the radiating nervures of the leaf-blade: this blade has the same texture, similar nervures with finely reticulated venations, even to the same peculiar excurrent free veins terminating abruptly in the centre of all the areoles, and the midrib is excurrent in a long mucronate point, as in the leaf of a *Cissampelos*. Again, the membranaceous tubes that surround the base of the petiolar support do not exist in the plant allied to *Triuris*; these sheaths consist of a simple cuticle with lacerated margins, without nerves or veins, but marked by several parallel lines, which under a lens are seen to be those peculiar ducts formed of dotted spiral walls so frequently seen in the *Menispermaceæ*, and of which no signs are visible in the accompanying plant, or in *Triuris*. The inference hence is irresistible, that the leaf-bearing stem has no connexion with the singular plant that accompanied it, and that it is only a young seedling of some other plant, probably of a *Cissampelos*. It has been necessary to be thus precise upon a point involving the validity of all Mr. Gardner's views regarding the affinities of *Triuris*.

Under these circumstances, the name of *Peltophyllum* can apply only to the *Menispermaceous* plant, and not to the other, for which a new appellation must now be given. As it differs from *Triuris* only in having six instead of three segments to its perianth, the name of *Hexuris* appears the most appropriate; and in order to retain the name of its discoverer in connexion with it, I propose to call it *H. Gardneri*. Its generic character may hence be reformed as follows:—

HEXURIS, Miers. *Peltophyllum*, Gardn.

CHAR. GEN. *Flores* dioici. *Masc.* ignoti. *Fem.* *Perianthium* profundè 6-partitum, hyalinum, persistens; laciniis obovatis, præfloratione valvatis, singulâ infra apicem cornu subulato duplè longiore gyrato incluso, demùm patentibus, marginibus reflexis. *Ovaria* indefinitè numerosa, minima, densissimè in gynæcium aggregata, sessilia, gibboso-ovata, 1-locularia, 1-ovulata. *Stylus* subulatus, ad faciem internam sublateralis, apice paulùm incrassatus, obliquè truncatus et stigmatosus. *Fructus* ignotus.

Planta *pusilla*, *Brasiliensis*, *diaphana*, *albescens*; rhizomate *fibroso*; caule *erecto simplici vel subramoso*; foliis *bracteiformibus paucis, basilaribus, ovatis, acutis, adpressis, hyalinis*; floribus *solitariis vel subracemosis*; pedunculis *1-floris basi bracteatis*.

1. HEXURIS GARDNERI, Miers.

Peltophyllum luteum, Gardn. in Linn. Trans. vol. xix. p. 157. tab. 15.

Planta sub-2-pollicaris, hyalina; caule imo foliolis 2 minimis donato; pedunculis 2-3-4 alternis, flore 3-plò longioribus; bracteis folio æqualibus.

Hab. in arenosis umbrosis humidis prov. Goyaz, Brasiliæ. *Gardn.* No. 3570.

Three years subsequently to the presentation of Mr. Gardner's paper, a memoir by Captain Champion appeared*, describing two plants which he had discovered in Ceylon, one of which was evidently allied to the *Sciaphila* of Blume, and both of very analogous structure to the foregoing genera. These, soon after his arrival in Ceylon, he had shown to

* Calcutta Journ. Nat. Hist. vol. vii. p. 463.

Mr. Gardner, who at first was much struck with their resemblance to *Triuris* and his *Peltophyllum*; but on account of their manifest affinity to *Sciaphila* he renounced that idea, and in some observations which he annexed to Captain Champion's memoir, he suggested their position as being in *Artocarpeæ*, that being the station assigned to *Sciaphila* by Endlicher. Captain Champion, on the contrary, was more inclined to place them in *Urticaceæ*, among the *Moreæ*, because of their aggregated carpels on a common receptacle.

The first plant described by Captain Champion is the *Hyalisma ianthina*; it greatly resembles *Triuris hyalina* in habit, and agrees with it, and with *Hexuris*, in being diœcious. The perianthium is cup-shaped at its base, with the border divided into eight pointed segments of equal size, being valvate in æstivation, with the apical points inflected in a vertical umbilicus. The male flowers have four stamens placed opposite each alternate segment, and almost sessile upon a fleshy prominent disc, as in *Triuris*; but the lobes of the anthers, instead of being distinct, are here confluent, at first four-celled, but afterwards bursting into two valves, by a transverse line across the apex on one of the cross polliniferous dissepiments. The ovaria are numerous and aggregated in the female flowers, but the style, instead of being subterminal and sublateral, as in *Triuris* and *Hexuris*, is here nearly basal upon the ventral face. The whole plant, as in those genera, is covered with prominent vesicles, forming a bullulato-cellular epidermis. The more important consideration of the structure of its seed will be noticed in a subsequent page.

The second plant described by Captain Champion, under the name of *Aphyllia erubescens*, is very similar in general habit and structure to *Hyalisma ianthina*, differing only in the number of the segments of the perianthium, which are six, as in *Sciaphila*, with six stamens opposite to them in the male flowers. The carpels in the female flower do not differ much from those of *Hyalisma*, excepting that the style is shorter and ciliate fringed, not long, simple and pointed. In all the pistilliferous flowers I have seen they are constantly somewhat polygamous, with three or fewer stamens, placed opposite the alternate segment, among the outer row of carpels; but whether they are polliniferous or otherwise, I have not been able to determine. The structure of the seed is exactly that of *Hyalisma*.

In Sir William Hooker's herbarium I found a plant of Mr. Cuming's collection from the Philippine Islands, that bears a great resemblance to *Aphyllia erubescens*: like it, the perianthium is 6-cleft, but the segments are not altogether glabrous, being furnished within at the apex with a tuft of long articulated hairs, and the stigma is radiate with similar cilia. I have noticed that all the flowers here are hermaphrodite, the three stamens being intermixed with the carpels, as in Captain Champion's plant above mentioned. The fruit is utricular, and of similar structure.

In the same herbarium is another plant, found by Purdie in Venezuela; it agrees with the two plants last mentioned in the form of its perianthium, and in having its flowers hermaphrodite, that is to say, with only one or two stamens, placed on the margin of a clustered heap of carpels: here, however, the segments are alternately somewhat narrower, the broader segments only having ciliate margins, but all are furnished at the apex internally with long articulated hairs, and the segments, as well as the bracts and bractiform leaves, are marked with long red spots, as in the two preceding species.

From these facts we may safely conclude, that neither the *Aphyllia* of Champion, nor Cuming's specimen from the Indian Archipelago, nor Purdie's from Venezuela, differ generically from the *Sciaphila tenella* of Blume, a very similar plant from Java, long before described in the 'Bijdragen' of that celebrated botanist.

Being compelled to impugn the accuracy of the observations of others, it is essential that I should detail minutely those facts which alone can guide us to a knowledge of the true affinities of these singular plants, and I therefore proceed to describe the structure of the seed, as I have found it in *Sciaphila*. Captain Champion, in the memoir above quoted, figures and describes the embryo as a comparatively large body lying across, and near the vertex of the albumen, with a pointed radicle as long as the cotyledonary portion; but the whole seed, he says, "is so minute, and difficult of dissection, that it is hard to say whether the cotyledons are one or two;" the radicle, he adds, "is slightly curved, and pointed towards the hilum; the albumen, which is originally liquid, becomes hard as the seed ripens, and usually causes the testa to burst on the side opposite the raphe." Gardner adds, "The radicle is short, conical, and of a brownish colour; the cotyledons elliptical, compressed, and white;" the embryo lies "on the outside of a thin *fleshy* albumen, or but slightly covered with it, on the side of the seed opposite the raphe, nearly straight, and with the radicle directed towards the hilum," which he states to be on the dorsal face of the seed. The albumen, which according to Gardner is "fleshy," is said by Champion to be somewhat "corneous" in *Hyalisma*, and "rather hard" in *Sciaphila*. It is remarkable that such circumstantial details are not only inconsistent with each other, but decidedly at variance with the structure of the seed, as I have observed it.

My observations upon the seed of *Sciaphila* are to the following effect. The outer coat is a distinct utricle, composed of cellular tissue with intervening merenchyma, the inner face being marked with muriform lines, the outer surface formed of large, prominent, subspherical and somewhat overlying vesicles. This bursts along the whole dorsal side, the apex and part of the ventral face, by a gaping line, displaying an entirely free, erect, obovoid body, connected only by its conical support with the base of the utricle. This body, in the dried state, is marked by several (about eight) prominent, dark-coloured, longitudinal ribs, with intervening hollow spaces, which are pellicular and transparent, the ribs being connected with transverse dark bars, and the membranous intervals marked with spots of a dark crimson colour; in the centre, the opaque seed is readily distinguished. This structure is rendered more apparent by making a transverse section of the whole, when the seed appears as if enclosed within a second indehiscent utricle: the ribs all spring from the conical support of the seed, and after running parallel are arched over, and all again are united in a dark tumescent strophiole, which is attached to the apex of the seed. This second envelope appears to partake somewhat of the nature of an arillus, in which the longitudinal ribs convey the nourishing vessels, and from whose common points of union the seed is both supported and suspended. The testa of the included oval seed is of a deep crimson colour, marked by several longitudinal lines, with very numerous transverse hexagonoid areolæ, forming an almost scalariform structure; it is hard, testaceous, and lined within by a fine, transparent, reticulated, adhering membrane; but not the smallest trace of any nervure, or distinct raphe, on the surface of the testa, can be distin-

guished, nor any mark of hilum, as described by Capt. Champion. The inner space is wholly filled by a translucent, hyaline nucleus, of so firm a texture, that the hard testa may be broken, without rupturing it; it is quite free, or perhaps connected by a mere point, at the apex of the testa. This nucleus is covered by a thin transparent integument, which is marked with large and somewhat longitudinally hexagonal reticulations, through the areoles of which are seen a number of included spherules of small size, and on making sections in different directions across this nucleus, it will be found to consist of an aggregation of homogeneous, spheroidal, or rather angular cells, which, by pressure, exude a transparent oil, and a quantity of most minute dark grains of solid matter: the cells appear all of equal size, and this arrangement was found to be constant in upwards of thirty very careful sections in various directions, sometimes in clean longitudinal slices cut parallel with the axis, or transversely, by which the whole internal structure was made distinctly apparent: these again were subjected to the compressorium, and examined under the simple and compound microscope of considerable power, but every effort to detect the slightest indication of a distinct embryo, or even to find one cell darker or larger than the others, has completely failed. The uniformity of these results, obtained from the seeds of the two species of *Sciaphila*, those of *Hyalisma*, and also of another genus yet to be described, warrants the conclusion that the nucleus, in all these cases, is deficient of an embryo. The fact that the seeds thus examined were nearly, if not entirely, ripe, is indicated by the bursting of the utricular covering, and their detachment in many cases from their basal support, both in *Sciaphila* and *Hyalisma*, as well as by the hardness and deep colouring of the testa, and the firmness of the nucleus.

The genus *Sciaphila* may be characterized as follows:—

SCIAPHILA, Blume. *Aphyllia*, Champ.

CHAR. GEN. *Flores* monoici vel polygami. *Perianthium* in utroque sexu simile, 6-partitum, basi cyathiforme; laciniis oblongis, acutis, reflexis, æstivatione valvatis, persistentibus. *Masc. Stamina* 6, in hermaphroditis abortu 3-1, in androphorum carnosum ferè sessilia; *filamenta* brevissima; *antheræ* transversim oblongæ, quadratim 4-loculares, apice rimâ transversali 2-valvatim hiantes. *Fœm. Ovaria* plurima, in gynæcium carnosum subglobosum densè aggregata, obovata, sessilia, 1-locularia; *ovulo* solitario erecto. *Stylus* lateralis ferè basalis, plus minusve papilloso-subciliatus. *Stigma* truncatum, papilloso-plumosum, rarè simpliciter obtusum. *Carpidia* plurima, densissimè aggregata, obovata, styli basi persistente notata, monosperma. *Pericarpium* utriculare, subtenuè, papilloso-rugosum, suturâ dorsali 2-valvatim hians. *Caryopsis* obovata, brevi-stipitata: *endocarpium* arilliforme, 8-10-costatum, costis basi apiceque confluentibus, transversim cancellatis, interstitiis membranaceis. *Semen* ovatum, basi apiceque endocarpio suffultum et suspensum: *testa* colorata, testacea, striis paucis longitudinalibus, aliisque creberrimis transversis scalariformibus signata, apice saturatiùs colorata; *integumentum externum* pelliculare, reticulatum, testæ adnatum; *integumentum internum* tenuissimum, areolis hexagonoideis magnis oblongis reticulatum, nucleum arcuè cingens. *Nucleus* (embryo protoblasteus) indivisus, homogeneus, carnosus-cereus, opalinus, cellulosus; cellulis parvis, subglobosis, materie grumosâ succoque oleoso farctis.

Herbæ pusillæ, utriusque hemisphæræ indigenæ, hyalinæ; rhizomate fibroso; caule erecto, simplici vel subramoso; foliis paucis, bracteiformibus, alternis, ovatis, acutis, adpressis, venis destitutis, celluloso-rugosis; floribus simpliciter spicatis, monoicis, ♂ superioribus, ♀ inferioribus; pedunculis 1-floris, basi bracteatis; bractea folio conformi.

1. *SCIAPHILA TENELLA*, Blume, Bijdr. 514; "tenerrima carnosâ aphyllâ, scapo simplicissimo erecto, floribus nutantibus, perigonii laciniis reflexis apice villosiusculis, stigmatibus sessilibus punctiformibus, baccis pluribus glandulis pellucidis tectis, semine sub-triquetro; testâ subcoriaceâ."

Hab. Java.

Obs. Nothing is known of this plant beyond the above description; it was placed by Endlicher among the doubtful genera at the end of his order *Artocarpeæ*, with the remark, "affinitas planè obscura."

2. *SCIAPHILA MACULATA*; hyalina, caule simplici, foliis bracteiformibus adpressis lineis interruptis rubris maculatis, perianthii laciniis sublanceolatis reflexis apice intus barbatis: alternis margine ciliatis, floribus inferioribus staminibus 3 cassis?, carpellis densissimè congestis, utriculo hiante.

Hab. in insulis Philippinis; *Cuming*, No. 2088.

This plant has a very slender erect stem, and is altogether about 3 inches in height; the flowers are alternate and nodding, upon filiform pedicels, 3 lines in length, each with a bract at base; the size of the cauline leaflets is half a line long: the spike forms two-thirds of the length of the whole plant. The structure of the seed has already been described: the length of each utricle is $\frac{1}{30}$ th of an inch; the included caryopsis is $\frac{1}{40}$ th long, $\frac{1}{80}$ th broad; the testa is $\frac{1}{60}$ th long, $\frac{1}{120}$ th inch broad: the size of each cell of the nucleus is about $\frac{1}{10}$ th of its breadth, or $\frac{1}{120}$ th inch in diameter.

3. *SCIAPHILA PICTA*; hyalina, caule subramoso erecto flexuoso, foliis bracteiformibus maculis longis rubris pictis, perianthii laciniis oblongis acutis patentibus rubro-maculatis apice intus barbatis: alternis sub-laciniatis ciliatis; tubo basique laciniarum lineis punctatis creberrimis violaceis ornatis, floribus hermaphroditis (an semper?), carpellis plurimis densissimè supra discum carnosum congestis staminibus 2 vel unico munitis.

Hab. in Venezuela, ad fluv. Apure, à cl. *Purdie* lect. Octob. 1845.

A single specimen only of this plant exists in the herbarium of Sir William Hooker, and is about 5 inches in height; it is dichotomous, throwing up from near the base two subflexuose erect stems, with short, few-flowered, terminal spikes; the pedicels are scarcely 2 lines long, the flowers are very minute, and drooping.

4. *SCIAPHILA ERUBESCENS*; hyalina tenerrima, foliis bracteiformibus bracteisque acutis rubro-pictis, floribus punctis rubris maculatis, perianthii laciniis æqualibus oblongis acutis glaberrimis reflexis; superioribus masculis; inferioribus fœmineis interdum hermaphroditis, staminibus 3 cassis?, utriculo bivalvi.

Aphyllia erubescens, Champ. in Calc. Journ. Nat. Hist. vii. p. 468.

Hab. Ceylon, ad Narawalla, prope Galle, in sylvis umbrosis.

This plant is about the size of *S. picta*, throwing up from the base a second scape, as soon as the first has matured all its seeds. The flowers, which are hyaline, with reddish long spots, become purplish when the fruit is well formed; the ovaries and utricles are sanguineous red, and covered with prominent pellucid areoles; the bracts and leaflets are

half a line long, the pedicels 2 lines, and the flowers $\frac{1}{2}$ to $\frac{3}{4}$ of a line in diameter. Capt. Champion states that he has occasionally found all the flowers pistilliferous, and that the utricles do not burst until some time after the fruit is fully ripe.

HYALISMA, Champion.

CHAR. GEN. *Flores* monoici vel dioici. *Perianthium* in utroque sexu simile, 8-partitum; laciniis lanceolatis, æqualibus, patentibus, celluloso-rugosis, basi in urceolum coalitis, æstivatione valvatis, persistentibus. *Masc. Stamina* 4, in androphorum carnosum prominulum ferè sessilia, laciniis alternis opposita; *filamenta* brevissima; *antheræ* quadratim 4-loculares, peltatæ, apice lineâ transversali 2-valvatim hiantes; *pollen* sphæricum, simplex. *Pistilli* rudimentum nullum.—*Fem. Stamina* nulla. *Ovaria* plurima (50 ad 60), densissimè in gynæcium carnosum liberum aggregata, obovata, 1-locularia; *ovulo* unico erecto. *Stylus* ferè basilaris, ovario 3-7-plò longior, subulato-filiformis, celluloso-articulatus, apice subobtusum, stigmate inconspicuo. *Carpidia* plurima, utricularia, obovata, breviter stipitata, structurâ omninò *Sciaphila*.

Herba *Ceylanica*, *pusilla*, *hyalina*; rhizomate *fibroso*; caule *simplici erecto*; foliis *bracteiformibus*, *alternis*, *ovatis*, *acutis*, *venis destitutis*, *celluloso-rugosis*; spicâ *terminali*; floribus *pedicellatis*, *sæpissimè dioicis*, *interdùm monoicis*, *et tunc superioribus masculis*, *inferioribus femineis*; *pedicellis 1-floris*, *basi bracteatis*.

1. HYALISMA IANTHINA, Champion (*loc. cit.* p. 466, eum icone); *hyalina*, caule erecto striato, foliis paucis bracteiformibus acutis, floribus purpurascens, perianthii laciniis patentibus marginibus subreflexis bullulato-rugosis.

Hab. Ceylon, prope Galle, in sylvis humidis.

This plant is from 4 to 8 inches in height; the stem is slender, erect, and often flexuose. Capt. Champion states that the flowers are generally monœcious, but his specimens are all, without exception, distinctly dioecious. The leaves and bracts are a line in length; the eapillary pedicels 4 lines long, the male flowers $1\frac{1}{2}$ line, the female 2 lines in diameter; the stamens are fixed upon the margin of a somewhat quadrately conical roundish receptacle, very analogous to that of *Triuris*, from which genus *Hyalisma* differs in the form of its anthers, the cells of which are here confluent. It is very easily distinguished from *Sciaphila*, by the extreme length of the persistent style, and its much longer pedicels.

Among the specimens recently sent from Parà by Mr. Spruce, is one much resembling the foregoing plants. The stem is in like manner simple and erect, the flowers spicate and monœcious; the perianth is however here 4-lobed, with only two stamens in the male flowers: in the female the carpels are very numerous and densely aggregated, with a lateral and basal style, as in *Sciaphila*. The fruit is of the same shape, but is not utrieular, as the pericarpial and endocarpial envelopes are glued together with woody matter, and are separated, with some difficulty, from the crimson-coloured testa, which, together with the included nucleus, coincides with that above described of *Sciaphila*. I have proposed for it the name of *Soridium*, from *σορῖδς*, because of its aggregated carpels.

SORIDIUM, gen. nov.

CHAR. GEN. *Flores* monoici. *Perianthium* in utroque sexu simile, 4-partitum, basi cyathiforme; laciniis ovatis, acutis, patentibus, celluloso-rugosis, æstivatione valvatis, persistentibus. *Masc. Stamina*

2, supra discum minimum inclusum ferè sessilia, laciniis alternis opposita; *filamenta* brevissima; *antheræ* transversim elongatæ, compressæ, quadratim 4-loculares, rimâ verticali longitrorsum 2-valvatum et septucidim hiantes: *pollen* globosum, irregulariter sub-3-valvatim rumpens. *Pistilli* rudimentum nullum.—*Fem. Stamina* nulla. *Ovaria* plurima, in capitulum densè aggregata, obovata, sessilia, 1-locularia; *ovulo* solitario, erecto. *Stylus* lateralis et ferè basilaris, pilis longis clavatis plumosus. *Stigma* obconicum, truncatum, piloso-plumosum. *Carpidia* plurima, baccata, radiatim aggregata, obovata, stylo persistente basilari notata, monosperma. *Pericarpium* siccum, subcoriaceum; *semen* ovale; *testâ* colorata, *nucleoque* omninò *Sciaphila*.

Herba Amazonica in uliginosis umbrosis indigena, hyalina; rhizomate substolonifero, fibras radicales hinc inde emittente; caule simplici, erecto; foliis paucis, bracteiformibus, alternis, ovatis, acutis, venis destitutis, celluloso-rugosis; floribus spicatis, masc. superioribus, fem. inferioribus; pedunculis 1-floris, basi bracteatis.

1. SORIDIUM SPRUCEANUM, Miers.

Planta subhyalina; rhizomatis fibris elongatis, ciliatis, incanis; caule erecto, sulcato; foliis paucis, minimis, adpressis; spicâ simplici terminali; floribus fœmancis circiter 7, infimis; bracteâ lineari, acutâ, pedicello æquilongâ.

Hab. Parâ, ad Caripi in sylvis umbrosis.

At first sight this plant bears much the habit of *Dictyostega orobanchoides*. Its rhizoma appears somewhat stoloniferous, and to creep along the ground, throwing out at short intervals bunches of long hairy rooting fibres, each fibre springing out of a small cupuliform node, thus showing its endorhizal structure; the prostrate intervals are of the same thickness as the culmiform portion, and bear similar bracteiform leaflets. The spike occupies one-third of the length of the single erect stem, which is slender, sulcated, somewhat flexuose, and from 8 to 10 inches in height; the leaflets are few, and mostly towards the base; they are linear, pointed, $1\frac{1}{2}$ line long. The bracts are also linear, about the length of the pedicels, 1 line long; the flowers expanded measure 2 lines in diameter; the ovaria are from twenty to thirty in each of the female flowers, of which there are from five to seven at the lower portion of the spike. Although the pericarpial and epicarpial coverings of the seed are here glued together into one coriaceous mass by the deposition of woody matter, yet upon making a longitudinal section, the same nervures, basal support, and apical strophiole, that form so conspicuous a feature in the arilliform covering of *Sciaphila*, may here be distinctly traced, and the darker-coloured basal support, and apical strophiole, adhere so firmly to the testa, that they are with difficulty removed from it.

Having thus enumerated the facts connected with the history and structure of these remarkable plants, I will now offer a few remarks upon their affinities. They evidently belong to one common group, and coincide with *Triuris* in their general habit, their hyaline cellular texture, the absence of any green colour throughout their substance, their growth in damp shady places, their underground rhizoma, furnished with numerous long delicate fibrillæ, which probably derive much sustenance from the roots of other plants: they also agree in their simple erect striated stem, composed chiefly of cellular tissue and devoid of woody deposit, in their bracteiform veinless leaves, spicate bracteated inflo-

reseenee, unisexual flowers, simple perianthium, similar in both sexes, nearly cleft to its base into regular segments, with a valvate æstivation and a cellular epidermis; the male flowers furnished with few stamens, which are seated opposite the segments upon a fleshy disc, or more or less prominent androphorum; very numerous distinct carpels in the female flowers, having a more or less lateral style, and a single erect ovule, and offering a seed of most peculiar structure. These characters do not conform with any other natural family; for which reason, when *Triuris* only was known, I suggested it should form the type of a new order. In regard to the affinities of this group of plants, it is manifest that they bear no analogy with *Menispermæ* or *Smilacæ*, as Mr. Gardner at first inferred; nor can they be held related to *Artocarpeæ*, where that zealous botanist, following the example of Endlicher, referred *Sciaphila* and *Hyalisma*. Their structure, totally different habit, simple style, erect ovule, arilliform envelope, and acotyledonous seed, distinguish them in the most decided manner both from *Artocarpeæ* and *Urticæ*. In order to arrive at their real position in the natural system, we must first determine in what class to seek their nearest alliance.

The facts before shown lead to the inference, that the seed of the *Triuriaceæ* is not only acotyledonous, but inembryonal, a fact not singular in the history of Phænogamous plants. But does the absence of the usual elements constituting an embryo, viz. cotyledon, radicle, and plumula, imply the want of the ordinary function of the reproductive power of the plant from its seed so constituted? It appears that the presenee of such elementary parts is not always a necessary condition to the capacity of vegetable reproduction. According to the views of modern physiologists, the embryo is but a normal condition of a leaf-bud and stem, whose gradual increment is due to certain secretory deposits, regulated by fixed laws of cellular expansion, thus producing a highly complicated or low degree of vascular development in every phænogamous plant, from the smallest herb to the most gigantic tree of the forest. But in those plants destitute of real leaves, and composed of little more than simple cellular tissue, void of green colour, and of the fibres and ducts that enter into the structure of most other vegetable substances, we can hardly expect to meet with a reproductive embryo organized in the form of such a normal bud; and it is only consistent with so simple a structure, to expect a nucleus equally simple in its nature, formed merely of an aggregation of cytoblasts, which, under favourably-exciting influences, are endowed with the faculty of self-development. Indeed, we have no satisfactory evidence of the existence of an embryo, in the ordinary sense of this term, in the seeds of *Burmanniaceæ*, &c., notwithstanding that we know they must be constantly reproduced from their seeds.

Mr. Robert Brown, in his learned memoir upon *Rafflesia*, in the nineteenth volume of the Society's Transactions, has shown that the seeds of that genus, although albuminous, possess an embryo of the most simple and reduced form; but the *Balanophoreæ*, which that most distinguished botanist holds to be quite a distinct and even distant family from the *Rafflesiaceæ*, have been shown by Mr. Griffith to be truly inembryonal; and in his paper on *Balanophora* * he describes the structure of its nucleus, and the contents of its cells, as being precisely similar, even in words that answer in every respect for all that is

* Trans. Linn. Soc. vol. xx. pp. 98, 101 and 102.

seen in *Sciaphila*, *Hyalisma*, and *Soridium*, and the figures he gives of it* quite correspond with the details now offered of the seminal nucleus in these genera. Prof. Lindley has long contended that these two families belong to a distinct class, which he calls *Rhizanthæ* or *Rhizogens*; but Mr. Griffith, in his able memoir above-quoted, wholly accords with Mr. Brown's views on this subject, and states that these plants, though with inembryonal seeds, or with what he calls a homogeneous-embryo-form structure, may, without violating the rules of classification, be considered as aberrant forms of an imperfectly developed state of exogenous or endogenous organization. Thus, Mr. Brown has always considered the *Rafflesiaceæ* to be allied to the *Aristolochiææ*, and Mr. Griffith contends that the *Balanophoreæ* should be placed near the *Urticeæ*.

The considerations before stated naturally lead to the inquiry, if in such plants no embryo exist, using that term in its ordinary signification, how is their propagation effected by a seed with a simple nucleus of aggregated cells? According to the views of most modern physiologists, the earliest development of an embryo within the ovule is the formation of a germinal vesicle (primordial utricle of Mirbel), generated by the action of the pollen-tube upon the embryonal sac, and the degree of perfection in the organization of the cotyledon, radicle, and plumula, is evidently proportioned to the function requisite to the future elaboration of the leaves, or a more or less complex stem; but in the case of leafless plants, the same amount of development would be useless for so simple an economy of structure. This is even seen in plants of a very high degree of floral development, as in *Cuscuta*, for instance, where the embryo of its seeds is altogether deficient (apparently) of the usual requisites of cotyledons, radicle, and plumule †, as it consists of a simple spiral thread, not germinating in the usual manner from two fixed points, but from which pullulating vesicles are produced, indifferently from any point of its surface, thus proving that the organization of the embryo bears an evident relation to the economy of the future plant. The *Orobancheæ* also present a very small undivided embryo, and the *Monotropææ* have a minute nucleus, in which neither cotyledon nor radicle is perceptible; and this is included in a reticulated arillus, as in *Burmanniaceæ*. Another instance, still more striking, occurs in *Cacteæ*, where in the leaf-bearing genera the cotyledons are fully developed in the embryo, while in the leafless species the embryo is solid and undivided. In the same manner it is probable that in the *Burmanniaceæ*, *Balanophoreæ*, *Triuriaceæ*, &c., the inembryonal nuclei, consisting of a series of germinating cells or cytoblasts, pullulate at certain points, and thus perform all the requisite purposes of reproducing their very simple forms of structure, in a somewhat analogous way to that in which the ordinary embryo effects the more complex organization of vascular fibres and elaborate tissues in the higher orders of Phænogamous plants.

If we admit the existence of an organ, thus endowed with the function, but wanting the usual structure of the embryo, it should hold some adequate designation, and for this the term *Protoblastus* does not seem inappropriate, as it effects the same purpose as the gemmule or plumula ‡. The word used by Mr. Griffith for this organ, "homogeneous embryo," would require that the ordinary embryo, in contradistinction, be called hetero-

* Trans. Linn. Soc. vol. xx. pl. 8. fig. 9-14.

† Lindley, *Introd. to Bot.* p. 217.

‡ In a similar sense, Richard has applied the term *blastus* to the plumula of the seed in *Gramineæ*.

gencous, which would not accord with its nature; but if these denote only different conditions of the embryonary form, the one may be considered as a *protoblastous*, the other as a *cotyledonous* embryo. On surveying other peculiar embryonal forms, some will be better understood by this view of the subject; for instance, we may conceive that the protoblastus, instead of forming one compact mass of spherules, as in *Balanophoreæ*, *Triuriaceæ*, &c., may be somewhat less aggregated, so as to assume the shape of elongated bundles of cells, such as have been termed paraphysiform: such a form is actually met with in *Ceratophyllum*, where the exterior series of unequal size have been assumed to be an unusual number of cotyledons, and the very numerous inner series have been held to be a highly developed plumule, while the common point of their union is considered as the radicle. The development of this embryo has been well analysed by Schleiden, in his memoir on *Ceratophyllum* *. Professor Lindley remarks †, that “in this instance, as in *Nelumbiaceæ*, the highly developed plumule may be a compensation for the want of albumen, enabling the embryo to germinate without assistance, as soon as it is exposed to the fitting conditions.” The leaves of *Ceratophyllum* appear destitute of all nervures, consist of confervoid parallel cells, and dichotomously divide themselves into simply articulated hair-like segments, thus denoting a lower order of development than has been assigned to it. Independently of this cellular texture, we must bear in mind that this genus possesses monœcious flowers, with a simple perianth, having a valvate æstivation, almost sessile stamens, an unilocular carpel with a solitary ovule; and if, in addition to these characters, we regard the construction of its embryo, in the view above contemplated, its position in the system would rank near *Fluviales*, as was long ago suggested by Bernard and Antoine de Jussieu, followed by Jaume St. Hilaire and Agardh, and therefore, as will be seen, not far from *Triuriaceæ*. Conterminous with the *Fluviales* we find another family, the *Aroideæ*, which offers many circumstances bearing upon this subject. Blume describes *Amorphophallus* ‡ as possessing an exalbuminous simple nucleus, homogeneous in texture, with one of its extremities pullulating at one, two, or three points, and throwing out fleshy lobes, which overlap each other. The same botanist records, that in *Aglaonema* the seed has a solid nucleus, which, in germination, throws out several squamulæ at one end §; and Schott states that the nucleus of *Cryptocoryne* emits several gemmulæ in a similar manner ||. This fact has been confirmed and illustrated in an admirable manner by Mr. Griffith, in a very interesting memoir upon *Ambrosinia* (*Cryptocoryne*) *ciliata* ¶, where he has shown, that at an early period the ovule presents an embryo, which then appears to be quite homogeneous, and “entirely cellular,” and that its development is first marked by the production, upon a

* Linnæa, vol. ii. p. 512.

† Vegetable Kingdom, p. 263.

‡ In Rumphia, i. 138: “in quo ad extremitatem inferiorem umbilicum spectantem una rarius 2 vel 3 minutæ gemmulæ germinantes observantur; gemmulæ ejusmodi constant squamulis aliquot carnosissimis sibi oppositis et sese amplectentibus.” (Kunth. Enum. iii. 32.)

§ “Embryo semini conformis, exalbuminosus, solidus, ad extremitatem radicalem squamulis aliquot munitus.”—Rumph. i. 130. (In Endl. Gen. Pl. Suppl. p. 1370.)

|| “Embryo cotyledonibus (protophyllis?) plurimis.”—Schott, Meletem. Bot. (In Kunth. Enum. iii. 12; et Trans. Linn. Soc. vol. xx. p. 266.)

¶ Trans. Linn. Soc. vol. xx. p. 263.

small area of its surface, of several minute oblong cellular bodies, which soon enlarge, others in great numbers being successively formed in their centre. These rudimentary processes soon become more and more elongated, their growth being very rapid, until they acquire five or six times the length of the original globular nucleus, from which, when fully developed, they finally detach themselves, the nucleus remaining enveloped in the swollen integuments. This new production thus assumes the form of a large plumula, still more highly developed than that of *Ceratophyllum*, and separates in the manner above described, as the germ of a future plant, consisting of an immense number of subulate thread-like processes, at least an inch long, which are furnished with vessels, but their chief bulk is cellular, the cells containing a number of green globules. Mr. Griffith remarks, that the cells of the nucleus, as well as of the processes, in an early stage of their development, abound in active molecules, possessed of an exceedingly rapid oscillatory motion; and it is obvious, from the universal presence of these corpuscles during the formation of tissue, that they play an important part in this most obscure process. Mr. Griffith considered the nucleus to be the cotyledon, the processes as forming a plumula, and the neck, which united them at base and which is seated upon the globular cotyledon, to be the radicle; but these parts do not seem to bear any analogy to such elementary portions of the ordinary embryo of phænogamous plants, as is evinced by the quite unusual position of what is here considered a radicle, between the cotyledon and plumula, and by the fact of the detachment of such cotyledon, which has always been held to be necessary to the completion of the germinating functions of the radicle and plumula. Mr. Griffith endeavoured to explain these contradictions by ingenious reasonings, which, however, are far from being satisfactory, as he was forced to acknowledge that this case forms a remarkable exception to the general law of the absolute necessity of a cotyledon in a distinct embryo, and that it is only to be accounted for on the plea that the presence of such a highly developed plumula obviates that necessity. These anomalies, however, appear to me more satisfactorily explained by considering the original nucleus in the light of a simple protoblast, from which a certain number of its cells, animated by the oscillatory motion of the active molecules, as described by Mr. Griffith, pullulate and attain a rapid increment, by the production of a number of thread-like cellular processes (or protophylla) united at their base by the common centre of the original germinating cells (or epiblast). The plumula of Griffith may thus be considered simply as an aggregated bundle of protophylls, destined to form the germs of future leaves; and his radicle may be viewed merely as an epiblast, which, however, performs all the functions of a radicle, by subsequently generating from its former point of attachment other cells to constitute future rooting fibres; and his cotyledon remains only the original protoblast, which having thus performed its function of elaborating a gemmiferous prototype, becomes detached from its offspring. Under this point of view the embryo of *Cryptocoryne* may be considered as protoblastous, and not as cotyledonous, and the anomalies above shown vanish without calling in aid forced exceptions to the ordinary laws of development.

The *Pistia*, considered as a suborder of the *Aroideæ*, present some circumstances analogous to the structure of *Sciaphila*. On examining the seed of *Pistia obcordata*, I find that what has been described as its testa is in fact an arillus, which in some degree may

be compared with the arilliform covering above described in the genus just mentioned. The embryo of *Pistia* is cylindrical, nearly half the length of the albumen, in the summit and in a longitudinal cavity of which it is placed, with its apex quite bare, the whole being enveloped by a thin pellicular integument, and this again by a thin and somewhat coriaceous reddish testa, marked much after the manner of that of *Soridium*. This testa is fixed upon a long, thickened, stipitate support, and is crowned at its apex by a dark pulvinate process, suspended by a cylindrical plug or strophiole, the point of which is seen in the umbilical apex of the seed. The external covering is a thick, wrinkled, fungous or pithy substance, lined inside and outside by a thin adhering membrane, and enclosing the stipes, the testa and the strophiole, and it can be considered in no other light than an arillus, and as analogous to the peculiar covering of the testa seen in *Sciaphila*. In the *Zingiberaceæ* the seed is also covered by an arillus somewhat similar to that of *Pistia*, while in *Ravenala*, by its numerous ribs, it approaches yet nearer to the seminal envelope of *Sciaphila*; here, however, as well as in *Pistia*, the albumen is of peculiar structure, being farinaceous when dry but becoming distinctly cellular when moistened, and the cells are separable from each other without bursting; they are then translucent, and bear altogether a very different aspect from those seen in the nucleus of *Sciaphila*, in which they are more opaque, as if filled with dark grumous matter. The facts here brought together are interesting, as presenting some analogies bearing upon the question, and they serve to show that we have yet much to learn concerning the nature of the more simple forms of embryonal structure, and of the functions of reproduction.

In respect to the position of the *Triuriaceæ* in the system, if we follow the rules of classification founded upon the three great divisions of Acotyledonous, Monocotyledonous, and Dicotyledonous plants, a plan now quite untenable, they must of course range in the same group as the *Balanophoreæ*, although they hold but little relationship with them. But if we regard the condition of the embryo, not as a basis, but merely as a frequent indication of the three great divisions, founded on the structure and development of vegetable fibre, viz. Aerogens, Endogens and Exogens, and if we accord with the views of Mr. Brown and Mr. Griffith, in considering what the latter calls the homogeneous-embryo-form state of the seed merely as an imperfect condition of development, common alike to all these groups, then the *Triuriaceæ* must take their place among the Endogens.

Here, the family that at first sight appears most approximate is the *Alismaceæ*, with which the *Triuriaceæ* agree, in their simple stem, sometimes spicate unisexual flowers, and their numerous carpels; but *Alismaceæ* differ in having leaves with parallel nerves, in their floral envelope being distinctly biserial, the outer calycine, the inner petaloid, and both with imbricated æstivation; they are also dissimilar in their bilocular anthers, with parallel cells, dorsally affixed to long filaments; ovules often two in each carpel, one being superimposed; carpelid opening by their ventral suture, and seeds with large hippocrepiform embryo.

With *Fluviales*, *Triuriaceæ* accord in their soft cellular structure, their monœcious flowers, simple perianthium with valvate æstivation, often 4-locular anthers, several distinct ovaria, with a single erect ovule in *Caulinia* and *Najas*, baccate fruit, with a pericarpial utricule bursting on one side in *Althenia*, *Zostera*, *Najas* and *Cymodocea*; but

the plants of this family differ wholly from the *Triuriaceæ*, in having distinct, entire, large leaves, with long amplexicaul petioles, and intrapetiolar vaginant stipules, in their female flowers arising from the superior axils, in the frequent absence of any perianthium, ovules often suspended from the ventral suture, and very delicate membranaceous testa. Their exalbuminous macropodous embryo may be considered as an approximation to the structure of the nucleus of *Sciaphila*.

With the *Juncagineæ* they agree in their inconspicuous spicate flowers, numerous carpels, with a solitary erect ovule and exalbuminous seeds; but these again differ in their large leaves, with parallel nervures, 2-serial floral envelope, extrorse stamens upon long filaments, and sometimes two ovules in each carpel. The *Juncagineæ*, however, have been considered by some as a suborder of the *Alismaceæ*, by others to be more nearly allied to *Fluviales* and *Aroideæ*, on account of their spicate flowers: indeed, though placed at so great a distance in the system by Endlicher, they are really so closely allied, that the genera *Ruppia* and *Potamogeton* are placed by some botanists in *Fluviales* and by others in *Juncagineæ*.

If we agree in placing these four families in closer juxtaposition in the system*, the *Triuriaceæ* will find a place near them; but, upon the whole, the greatest amount of approximative characters will be seen to lean towards the *Fluviales*, especially through *Potamogeton* (which genus is arranged by Mr. Brown among the *Alismaceæ*), and which possesses a simple perianth of four segments in a single series, with valvate æstivation, and four stamens opposite to them, globose simple pollen and uniovular carpels; and although it bears hermaphrodite flowers, it must be remembered that *Sciaphila* is sometimes bisexual. *Najas* and *Caulinia*, as before observed, present also carpels with a solitary erect ovule.

It now only remains to define the characters of this small order.

TRIURIACEÆ, Miers (1841). *Triuraceæ*, Gardn. (1843). *Triuridaceæ*, Lindl. (1846).

Herbæ parvulæ, subhyalinæ; *rhizomate* fibroso, interdùm substolonifero; *caule* subsimplici, texturâ cellulosa, vasis deferentibus in axi centralibus; *foliis* alternis, bracteiformibus, sessilibus, nervis destitutis. *Flores* monoici, vel dioici, rariùs polygami, spicati; *pedicellis* alternis, 1-floris, basi bracteatis. *Perianthium* in utroque sexu simile, 3-4-6-8-partitum, hyalinum, texturâ celluloso-bullatâ, vel papilloso-rugosâ; laciniis ovatis, acutis, basi in tubum brevissimum coalitis, apice interdùm processu elongato donatis, æstivatione valvatis. *Stamina* numero varia, pauca, in fundo perianthii ferè sessilia, supra androphorum sæpissimè magnum carnosum inserta; *antheræ* 4-loculares, 2-valves, rariùs in lobos 2 sejunctæ. *Ovaria* plurima, in gynæcium toro adnatum densissimè aggregata, 1-locularia; *ovulo* unico, e basi erecto. *Stylus* excentricus, introrsùm lateralis, sæpissimè ferè basilaris, glaber aut plumoso-fimbriatus. *Stigma* obsoletum, vel truncato-clavatum. *Carpidia* plurima, baccata, radiatim excentrica, obovata, stylo persistente ferè basilari notata, coriacea et indehiscencia, vel interdùm utricularia dorso valvatim dehiscencia; *caryopside* obovatâ, telâ arillæformi donatâ: *testâ*

* This we find adopted in the 'Prodromus Floræ Novæ Hollandiæ' of Mr. Robert Brown, where the *Aroideæ*, *Fluviales*, *Alismaceæ*, and *Juncagineæ* are placed in contiguity, with the intervention of *Pandanus* alone, of which it is worthy of remark that it also offers the peculiarity of an entire and simple embryo: and nearly the same arrangement occurs in the system of De Jussieu.

ovatâ, durâ, testaceâ, coloratâ, transversim scalariformi-striatâ. *Nucleus* (embryo protoblasteus) opalinus, integumento arcolis eloñgatis reticulato inclusus, texturâ mollis, cellulosus; cellulis materie oleosâ grumosâ faretis.

Triuriaceæ in locis humidis umbrosis sylvarum intertropicarum totius orbis epigeæ.

The family may be thus divided :—

§ 1. TRIURIEÆ. Perianthii lacinia appendice lineari, æstivatione spiraliter tortâ et inclusâ, demùm exsertâ, munitâ. Stylus cum ovario gibboso lateraliter continuus. Antherarum lobi disjuncti, singuli 2-locellati.

Perianthii lacinia 3. Stamina 3. . . 1. *Triuris*.

Perianthii lacinia 6. Stamina ignota . . 2. *Hexuris*.

§ 2. SCIAPHILEÆ. Perianthii lacinia ecaudatâ. Stylus ferè basilaris. Antherarum lobi confluentes, et inde 4-locellati, rimâ transversali v. verticali 2-valvatim hiantes.

Perianthii lacinia 4. Stamina 2. . . 3. *Soridium*.

Perianthii lacinia 6. Stamina 6. . . 4. *Sciaphila*.

Perianthii lacinia 8. Stamina 4. . . 5. *Hyalisma*.

EXPLANATION OF THE PLATES.

TAB. VI.

Fig. 1. A plant of *Sciaphila erubescens* :—of the natural size.

Fig. 2. A single male flower.

Fig. 3. The same :—magnified.

Fig. 4. A section of the same, showing three of its stamens placed opposite the segments, upon the central fleshy androphore.

Fig. 5. An anther before dehiscence :—more highly magnified.

Fig. 6. The same, burst open; showing its transverse mode of dehiscence, and the cruciform septa which form the divisions of its four cells.

Fig. 7. A female flower of the same plant, after expansion :—magnified.

Fig. 8. A single pistil, showing its lateral and nearly basal style.

Fig. 9. A fruit :—of the natural size.

Fig. 10. The same, showing its persistent style :—magnified.

Fig. 11. The same, showing the mode in which the pericarp opens and displays its single erect seed.

Fig. 13. A plant of *Sciaphila picta* :—of the natural size.

Fig. 14. A single male flower, in bud :—much magnified.

Fig. 15. The same, expanded.

Fig. 16. A female flower of the same, expanded :—equally magnified.

Fig. 17. An anther, before and after dehiscence.

Fig. 18. A single pistillum, showing its lateral style.

Fig. 19. A plant of *Sciaphila maculata* :—of the natural size.

- Fig. 20. A single hermaphrodite flower.
 Fig. 21. The same, in bud, and inverted upon its slender pedicel, with its corresponding bract :—magnified.
 Fig. 22. The same, reversed, in order to show the position of its three stamens among its numerous pistilla.
 Fig. 23. An anther, expanded.
 Fig. 24. The style.
 Fig. 25. A single flower of the same plant, after the ripening of its fruit :—of the natural size.
 Fig. 26. A single fruit :—natural size.
 Fig. 27. The same, exhibiting its persistent lateral style :—magnified.
 Fig. 28. The same, with the pericarp burst open, exhibiting its single erect seed inclosed in its peculiar endocarpial covering.
 Fig. 29. The pericarp, after bursting, with the seed removed.
 Fig. 30. The endocarpial covering of the seed, as seen from above, showing its eight prominent ribs.
 Fig. 31. A side view of the same, showing the cancellated structure of the endocarp and the markings of its areolæ.
 Fig. 32. The same, with half of the endocarpial covering removed, in order to show the mode of attachment of the summit and base of the seed to the ribs of the endocarp.
 Fig. 33. A transverse section of the seed and endocarpial covering.
 Fig. 34. The seed removed, showing the markings of its testa.
 Fig. 35. The nucleus, as seen after the removal of the testa, inclosed in its reticulated integuments.
 Fig. 36. A transverse section of the same, showing the granular or cellular structure of the hyaline nucleus.

TAB. VII.

- Fig. 1. A male plant of *Hyalisma ianthina*.
 Fig. 2. A female plant of the same :—both of the natural size.
 Fig. 3. A single male flower with its pedicel and bract :—of the natural size.
 Fig. 4. A bud of the same, seen from above, in order to show the mode of æstivation of its eight segments.
 Fig. 5. The same, expanded; showing the position of its four stamens upon its fleshy androphore :—much magnified.
 Fig. 6. An anther, before and after dehiscence.
 Fig. 7. A female flower, expanded :—equally magnified.
 Fig. 8. A single pistil, with its elongated basal style :—more highly magnified.
 Fig. 10. A plant of *Soridium Spruceanum* :—of the natural size.
 Fig. 11. One of its male flowers expanded :—much magnified.
 Fig. 12. A side view of one of its stamens :—more highly magnified.
 Fig. 13. The same, seen edgeways.
 Fig. 14. A section of the same, showing its two cells.
 Fig. 15. The same, seen sideways, in order to show its mode of dehiscence.
 Fig. 16. A transverse section of the same.
 Fig. 17. Grains of pollen, still more highly magnified.
 Fig. 18. A female flower supported on its pedicel and bract :—magnified.
 Fig. 19. A pistil :—of the natural size.
 Fig. 20. The same :—much magnified.

- Fig. 21. A longitudinal section of a pistillum, with one half removed, in order to show its single erect ovule.
- Fig. 22. A fruit:—of the natural size.
- Fig. 23. The same, with its persistent basal style:—much magnified.
- Fig. 24. A longitudinal section of the same, exhibiting its single seed enclosed in its fleshy pericarp.
- Fig. 25. The seed removed, showing the particular reticulated surface of the testa.
- Fig. 26. The same, after the removal of the testa, exhibiting the reticulated texture of the nuclear integuments.
- Fig. 27. A transverse section of the same, showing the granular texture of the nucleus.
- Fig. 28. A longitudinal section of the entire fruit, exhibiting the structure of the whole.
- Fig. 29. A section of the fruit of *Pistia obcordata*, showing its single seed, enveloped by its pithy arillus, its apical stropholiar attachment, its testa upon a basal support, and its embryo placed in the summit of its albumen.
- Fig. 30. The embryo of the same.